

# Coupling and Coordination of Marine High-end Human Resources and Marine Innovative Economic Development Ability

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## ABSTRACT

Jia, D., 2019. Coupling and coordination of marine high-end human resources and marine innovative economic development ability. In: Gong, D.; Zhu, H., and Liu, R.(eds.), *Selected Topics in Coastal Research: Engineering, Industry, Economy, and Sustainable Development. Journal of Coastal Research*, Special Issue No. 94, pp. 573-576. Coconut Creek (Florida), ISSN 0749-0208.

Combined with the information space theory, a kind of method for the Marine high-end marine high-end human resources management system in the Coupling coordination of the Marine Innovative Economy is put forward in this paper. The information space theory can be used to describe the relationship between the Marine high-end marine high-end human resources management system and the information space theory. Information space theory is used to represent the interdependence relationship between the Marine high-end marine high-end human resources management systems in the Coupling coordination of the Marine Innovative Economy. The relationship between the Marine high-end marine high-end human resources management system and the Coupling coordination of the Marine Innovative Economy can be determined through the information space theory, which has minimized the engineering quantity of the Marine high-end marine high-end human resources management system in the Coupling coordination of the Marine Innovative Economy. The optimal Coupling coordination method for the Marine high-end marine high-end human resources management system in the Coupling coordination of the Marine Innovative Economy is determined by the information space theory. The Marine high-end marine high-end human resources management system in the Coupling coordination of the Marine Innovative Economy is compared with the other Marine high-end marine high-end human resources management systems, and the Coupling coordination method for the optimal Marine high-end marine high-end human resources management system can be obtained accordingly.

**ADDITIONAL INDEX WORDS:** *Information space theory, coupling coordination of marine innovative economy, marine high-end marine high-end human resources management system, coupling coordination method.*

## INTRODUCTION

The scientific analysis method has a guiding role in the Coupling coordination of the Marine high-end marine high-end human resources management system. In general, the Coupling coordination method of the Marine high-end marine high-end human resources management system is on the basis of the Coupling coordination rules. This is because different influencing factors need to be taken into consideration for the Marine high-end marine high-end human resources management system that is in line with the Coupling coordination rules; the interrelationships between the models shall also be taken into consideration. Most researchers focus on the Coupling coordination method for the Marine high-end marine high-end human resources management system, but they may often ignore the influencing factors of the Marine high-end marine high-end human resources management system. From another perspective, it is highly difficult to build a Marine high-end marine high-end human resources management system (Kumar et al., 2017).

There are a lot of uncertainties in the process of constructing the Marine high-end marine high-end human resources

management system, such as the relationship of the variables between the Marine high-end marine high-end human resources management systems, as well as the unstable state of the input and output of the Marine high-end marine high-end human resources management systems (Faerber et al., 2018).

At present, there is an urgent problem to be solved, that is, how the researchers can quickly obtain the Coupling coordination method for the Marine high-end marine high-end human resources management system and reduce the number of the iteration calculations. Information space theory is a relatively good tool. In order to take this aspect of factors into consideration, the Marine high-end marine high-end human resources management system Coupling coordination method algorithm emerges (Lu et al., 2015). As for the relationship between the information space theory and the Marine high-end marine high-end human resources management system, IST can be used to describe the interdependence and constraint between them.

## INFORMATION SPACE THEORY

### Basic Definitions and Rules

On January 30, 2016, the US destroyer "Curtis Wilbur" sailed into the 12-nautical mile of Zhongjian Island belonging to the Xisha Islands. The US Department of Defense stated that the action was intended to "challenge the restrictions on

DOI: 10.2112/SI94-113.1 received 30 January 2019; accepted in revision 1 April 2019.

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	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$
$m_1$	i	*	*		
$m_2$			*	i	i
$m_3$			i	o	

Figure 1. Example of the information space theory

navigation rights of the United States and other countries.” And the restrictions imposed by freedom.” On October 27, 2015, the US “Larsen” warship sailed within 12 nautical miles of the Yansha Reef in the Nansha Islands in the name of the so-called “right to freedom of navigation.” The frequent maritime frictions between China and the United States have deep international political roots, as shown in Figure 1 below, which is the scope of the outer continental shelf submitted by South Korea:

It is assumed that there is a set  $M$  of the Marine high-end marine high-end human resources management system and the information space theory  $X$ , in addition,  $M = \{m_1, m_2, \dots, m_m\}$  and  $X = \{x_1, x_2, \dots, x_n\}$  are established; the interrelation relationship between  $M$  and  $X$  can be described by the information space theory as the following:

$$A = \{\alpha_{i,j} | 0 \leq i \leq m, 0 \leq j \leq n\}.$$

As shown in Figure 1 as the following, in which

$$\alpha_{i,j} =$$

- $\begin{cases} i, & x_j \text{ stands for the input of } m_i \\ o, & x_j \text{ stands for the output of } m_i \\ *, & x_j \text{ stands for the unknown relationship between the } m_i \end{cases}$

In the matrix, “i” stands for the system input parameter, “o” stands for the system output parameter. If there is certain relationship between a certain Marine high-end marine high-end human resources management system and the information space theory, but there is no way to determine whether it is input or output, then “\*” indicates that there is no connection between the Marine high-end marine high-end human resources management system and the information space theory. Hence, the corresponding matrix element is empty.

When the Marine high-end marine high-end human resources management system Coupling coordination method is used for the Coupling coordination, all non-empty unit preferred symbols in this process are “\*”, which are immediately replaced by “i” and “o” in accordance with the rules as the following.

- Rule 1: If the information space theory  $x_j$  is known and related to the Marine high-end marine high-end human resources management system  $m_i$ , then  $\alpha_{i,j} = "i"$ .
- Rule 2: If  $x_j$  is related to only one Marine high-end human resources management system  $m_i$  and at the same time  $x_j$  is not a known information space theory, then  $\alpha_{i,j} = "o"$ .
- Rule 3: If the information space theory  $x_j$  is already the output of the Marine high-end marine high-end human

resources management system  $m_i$ , that is,  $\alpha_{i,j} = "o"$ , it can no longer be used as the output of the other Marine high-end marine high-end human resources management systems, that is,  $\alpha_{i,j} \neq "o" (1 \neq i)$ .

Rule 4: The final number of the output parameters should be the same as the number of the output parameters in the initial definition.

After completing the information space theory in accordance with the aforementioned rules, if the “\*” in the information space theory has not been completely replaced by “i” or “o”, that is, the Marine high-end marine high-end human resources management system associated with “\*” is composed of the information space theory, it is referred to as the information space theory for short.

In the above information space theory that makes use of the “i” or “o” to replace the “\*”, it can be found that the relationship between the Marine high-end marine high-end human resources management system and the information space theory has become very clear. By using this information space theory and the known relationship between the Marine high-end marine high-end human resources management system and the information space theory, a kind of self-learning set  $B = \{b_{i,j} | 0 \leq i \leq m, 0 \leq j \leq m\}$  can be obtained, which can describe the relationship between the Marine high-end marine high-end human resources management systems. Among them,  $b_{i,j}$  can be determined in accordance with the rules as the following.

Rule 5:  $\forall m_i, m_j \in M | \forall i, j \in [1, \dots, m], \exists x_k \in X | k \in [1, \dots, n]$ , in which if the output of  $m_i$  is  $x_k$ , and  $x_k$  is the input of  $m_j$ , then  $b_{i,j} = "x"$ .

### Analysis on the Solution of the Information Space Theory

After the information space theory IST is found, there are not many problems to be solved, one of the problems is how to carry out decomposition on the information space theory IST, and then obtain the input and output relationship of the Marine high-end marine high-end human resources management system and the information space theory in the IST as we would like to obtain. In the following section, explanation is made through an example.

In the first step, the Marine high-end marine high-end human resources management system and its related information space theory are separated from the overall information space theory. Subsequently, as shown in Figure 2, the local information space theory ASCM AIST is established accordingly.

In the second step, rule 6: When the input information space theory of the Marine high-end marine high-end human resources management system  $m_i$  is different from the input information space theory in the initial definition, the “\*” of the  $i$ -th row in the ASCM can be replaced by “o.” In accordance with the known rule 6, a certain Marine high-end marine high-end human resources management system in the IST is selected to obtain the output information space theory, which means that certain “\*” in the ASCM will be replaced by “o”.

In the third step, the rules 1~4 are used to complete the replacement work. After the replacement is completed, move to

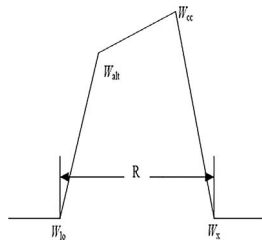


Figure 2. Changes in the Coupling coordination of the Marine high-end marine high-end human resources management systems at different stages.

the fourth step. If the Marine high-end marine high-end human resources management system in the rule 6 is not present in the real life, the symbol of the input and output relationship in the initial definition needs to be replaced. Subsequently, the solution process can be completed.

In the fourth step, after the previous three steps are completed, if there is presence of “\*” element in the ASCM, it means that the IST contains a sub information space theory, and the sub information space theory is Sub-IST. At this point, it is necessary to establish a new information space theory ASub-IST. Subsequently, from the beginning of the step 1, the process shall be carried on until all the “\*” have been completely replaced by “i” or “o”.

### MARINE HIGH-END HUMAN RESOURCES AND MARINE INNOVATIVE ECONOMIC DEVELOPMENT ABILITY

The method for the Coupling coordination of the Marine high-end marine high-end human resources management system is as the following. In the first step, the known or independent information space theory is used to determine the input of some talents. As the aforementioned rules must be observed, it is necessary to determine the distribution of “i” and “o” in the information space theory. If there is still the presence of the “\*” element, these elements are used to construct an information space theory IST and put together these innovative and entrepreneurial talents, hence it is changed from a decentralized to a macro Marine high-end marine high-end human resources management system, to establish an initial overall information space theory  $B_0^G$  that can be used to describe the Marine high-end marine high-end human resources management system.

In the second step, a local information space theory AAMSLA is constructed on the basis of IST. In accordance with the relevant rules, all the “\*” in the ASCM are replaced by “i” and “o”, which is exactly the opposite of the previous replacement behavior. Subsequently, the talent input and output information space theory in the IST can be determined.

In the third step, the initial local information space theory  $B_0^{SCM}$  for the relationship between the Marine high-end marine high-end human resources management systems in the IST is constructed through the input and output relationship of the known Marine high-end marine high-end human resources management systems in the step 2, and it is reconstructed and sorted to obtain the local information space theory  $B_{opt}^{SCM}$  after

the optimization. In this way, the method for the Coupling coordination of the Marine high-end marine high-end human resources management system in the IST can be determined.

In the fourth step, Lower triangle recoupling coordination is carried out on the  $B_0^G$  to obtain the optimized overall information space theory  $B_{opt}^G$ . Combined with the method for the Coupling coordination of the Marine high-end marine high-end human resources management system in the IST, the method for the Coupling coordination of all the Marine high-end marine high-end human resources management systems can be obtained accordingly.

The focus of the above process is how to solve the IST and how to complete the optimal planning of the Marine high-end marine high-end human resources management system coupling coordination method in the IST.

### OPTIMIZATION OF THE MARINE HIGH-END MARINE HIGH-END HUMAN RESOURCES MANAGEMENT SYSTEM

Through the above solution process, the input and output information space theory of the Marine high-end marine high-end human resources management system in the IST can be clarified in the end. In other words, the distribution of the “i” and “o” can be clarified. However, as the solution results are more than one, there are the cases where a number of results are obtained, it is necessary to analyze the input and output relationship of the Marine high-end marine high-end human resources management system for each solution result and obtain a method for the Coupling coordination of the Marine high-end marine high-end human resources management system for each solution result. It is also required that the optimal solution should be selected from the aforementioned talent Coupling coordination methods.

After the definition of the “i” and “o” in the ASCM is clarified, in accordance with the rule 5, the initial information space theory of the relationship between talents within the scope of the IST can be obtained as the following.

$$B_0^{SCM} = \{b_{ij} | 0 \leq i \leq r, 0 \leq j \leq r\}.$$

In the equation, r stands for the number of the Marine high-end marine high-end human resources management systems in the IST. The optimization of the method for the Coupling coordination of the Marine high-end marine high-end human resources management system is to reduce the feedback iteration of the Marine high-end marine high-end human resources management system, and then reduce the calculation time and workload, which can greatly save the effort required. Taking the  $[b_{i,j}]_{r \times r}$  into consideration, the information space theory is applied to determine the method for the Coupling coordination of the Marine high-end marine high-end human resources management system in the IST, and the objective function of the information space theory can be obtained as the following

$$\xi = \sum_{i=2}^r \sum_{j=1}^{i-1} b_{i,j}(i-j) + \sum_{k=1}^r b_{k,k} \tag{1}$$

In the equation,  $\xi$  stands for the amount of engineering in the Marine high-end marine high-end human resources manage-

ment system,  $b_{i,j}$  stands for the amount of engineering in two different Marine high-end marine high-end human resources management systems  $m_i$  and  $m_j$ .

**CASE ANALYSIS**

The following is a Marine high-end marine high-end human resources management system in the Coupling coordination of the Marine Innovative Economyies. There is a total of 7 Marine high-end marine high-end human resources management systems variables m1:m7, which are represented as the following respectively

$$W_e = W_o \times 2.61W_o^{(-0.1)}(W_o/S_{ref})^{-0.05} \tag{2}$$

$$W_o = W_f + W_e \tag{3}$$

$$W_{alt} = 0.985W_{lo} \tag{4}$$

$$W_x = 0.995W_{ec} \tag{5}$$

$$W_f = 1.06(1 - W_x/W_o)W_e \tag{6}$$

$$W_{lo} = 0.97W_o \tag{7}$$

$$W_{ec} = exp(0.00043R)W_{alt} \tag{8}$$

In the equation,

- We - the number of variables
- Wf - the number of influencing factors
- Wo - the level of the Marine Innovative Economy Coupling coordination
- Srof - the Coupling coordination indicator
- R- the Coupling coordination cycle

Wlo, Walt, Wec and Wx-stands for the Marine high-end marine high-end human resources management system in four different Coupling coordination stages, respectively (that is, the pre-Coupling coordination level of intelligence, capability, the Coupling coordination in the Coupling coordination process, and post-Coupling coordination level of intelligence) (Figure 2)

Through a number of experiments, after the consolidation is completed, Figure 3 can be obtained, that is, the initial input and output definition of the Marine high-end marine high-end human resources management system. It can be known that R (Coupling coordination cycle) in the information space theory is a known parameter. If the parameters R and We are input, an information space theory can be obtained in accordance with the rules 1~4. From Figure 3, it can be known that the Marine high-end marine high-end human resources management systems m2: m7 are composed of an information space theory IST and the unique solution result of the IST. As the information space theory and the rule 5 in Figure 3 need to be taken into consideration, the initial information space theory  $B_0^{SCM}$  for the relationship between the Marine high-

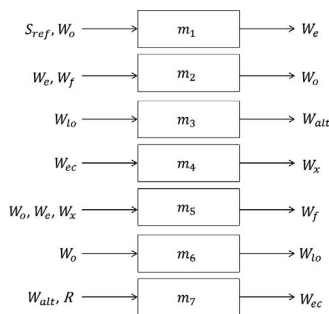


Figure 3. Definition of the initial input and output of the Marine high-end marine high-end human resources management system.

end marine high-end human resources management systems m2:m7 can be obtained. From the equation (1), it can be known that in the  $B_0^{SCM}$ ,  $\xi = -9$ . In the  $B_0^{SCM}$ , the information space theory is used to make the change in the rows and columns to obtain  $B_{opt}^{SCM}$ , which is the result after the optimization, in which  $\xi = -5$ . Therefore, the optimal Coupling coordination method for the Marine high-end marine high-end human resources management system in the IST can be obtained by using the  $B_{opt}^{SCM}$  as the following:  $m_7 \rightarrow m_4 \rightarrow m_3 \rightarrow m_6 \rightarrow m_2 \rightarrow m_5$ .

**CONCLUSIONS**

Information space theory can be used to describe the relationship between the Marine high-end marine high-end human resources management system and the Coupling coordination of the Marine Innovative Economy. In the research of the Marine high-end marine high-end human resources management system, in order to reduce the blindness of the operation and reduce the amount of feedback and iterative calculation, we can first carry out the optimization planning, which has a direct effect on the development of the Coupling coordination index through. In this process, in order to carry out better planning on the method for the Coupling coordination of the Marine high-end marine high-end human resources management system, scientific and systematic methods can be utilized. Combined with the information space theory, the complex relationship between the Marine high-end marine high-end human resources management system and the information space theory can be describes and revealed.

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